

REMARKS

Claims 1-3, 9-15, 34-35 and 40-50 are pending.

CLAIM REJECTIONS

Rejection under 35 U.S.C. § 103(a)

Hamade in view of the '188 patent, Hansen and James

The Examiner has rejected claims 1-3, 9-15, 34, 35 and 40-50 under 35 U.S.C. § 103(a) as being unpatentable over EP 0866103 to Hamade et al. ("Hamade") in view of U.S. Patent No. 5,770,188 to Hamade et al. ("the '188 patent"), Hansen et al., *J. Biol. Chem.*, 272(17), p. 11581-7 (1997) ("Hansen") and James et al., *J. Food Biochem.*, 21, p. 1-52 (1997) ("James"). See Office Action at p. 2. Claims 2-3, 9-15, 34, 35 and 40-48 depend from independent claim 1. Claims 49 and 50 are independent claims.

Claim 1 relates to an anti-fouling composition that includes a surface coating material, a first enzyme, a first substrate and a second enzyme. The first substrate is an oligomer or a polymer of a second substrate. The second substrate is a substrate for an oxidative enzyme, and the first enzyme is capable of generating the second substrate from the first substrate. The second enzyme is an oxidase. The second enzyme generates an anti-fouling compound when acting on the second substrate. Claim 49 relates to a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Claim 50 relates to a method for treating a surface of a vessel that includes applying a coating material to the surface in which the coating material includes a first enzyme, a first substrate and a second enzyme.

The Examiner contends that Hamade teaches "a method preventing fouling surfaces submerged in water by [] which an anti-fouling agent is produced by an enzyme action on its substrate, and anti-fouling composition comprising an enzyme and its substrate" See Office Action at p. 2. The Examiner further contends that Hamade "teach[es] that the substrate of the enzyme that produces the antifouling agent can be generated by the action of another enzyme or enzymes" *Id.* The Examiner has alleged that a skilled person would combine the teachings of Hamade that relate to hexose oxidase with the teachings of '188 patent that relate to

glucoamylase, and that such a combination would result in the invention claimed in the present application. See Office Action at p. 3-4. Applicants respectfully traverse this rejection.

Claims 1, 49 and 50 each recite the presence of a first substrate selected from oligomers and polymers of substrates for oxidative enzymes. Claims 1, 49 and 50 each recite that the first enzyme reacts with an oligomer or polymeric first substrate to produce a further second substrate on which a second enzyme included in the coating material (an oxidase enzyme) is active.

Hamade describes "a coating composition comprising a film-forming resin, an enzyme, and a substrate" See Abstract of Hamade. As Applicants have explained in the previous response filed October 17, 2006 and in the Pre-Appeal Brief Request for Review filed April 5, 2007, Hamade does not provide any suggestion or motivation to include a second enzyme in an anti-fouling composition or in a surface coating or coating material. Moreover, Hamade does not provide a reasonable expectation of successfully including a second enzyme in a composition or in a surface coating or coating material. Further, the disclosure in Hamade would actually lead the skilled person away from the subject matter at claims 1, 49 and 50 because Hamade teaches that a composition with only one enzyme has an anti-fouling effect. See Example 4 of Hamade.

Such a defect is not remedied by the '188 patent. The '188 patent is directed to an antifouling paint composition which includes a lipid-coated enzyme. See col. 1, lines 8-12. In a preferred aspect described in the '188 patent, the paint comprises an enzyme-susceptible resin and the lipid-coated enzyme is an enzyme capable of catalyzing the degradation of said resin. See the Summary of Invention in '188 patent. The combination as suggested by the Examiner neglects the direct teaching of the '188 patent which discloses paint compositions that contain **a single lipid-coated enzyme** only. See the reference to "a lipid-coated enzyme" in the claims and the Statement of Invention. Applicants further note that all of the examples use a single enzyme.

Again, all of the anti-fouling compositions taught in EP 0866103 also contain only one enzyme. See for example, Example 4 of Hamade. Hence, Applicants submit that the combination with the teachings of the '188 patent would merely reinforce the conclusion that a composition comprising a single enzyme is sufficient. Furthermore, the '188 patent discloses that either oxidoreductases (see col. 4, line 1 of the '188 patent) or glucosidases (see col. 4, lines 30-31 of the '188 patent) may be used as alternatives for the single lipid-coated enzyme. Applicants note that hexose oxidase is also an oxidoreductase. Hence, even if a skilled person

were to combine the '188 patent with EP 0866103, as suggested by the Examiner, this would at best indicate to a skilled person that they could use hexose oxidase rather than a glucosidase as the single lipid-coated enzyme.

To produce a two-enzyme system as alleged by the Examiner would require a skilled person to choose to produce a more complex and more expensive system without providing any reasons or advantages that would suggest that such a system is worthwhile, and without providing any reasonable expectation that a second enzyme may be successfully included. As such, there is no suggestion or motivation in Hamade and the '188 patent to modify the teachings of Hamade and the '188 patent to produce an anti-fouling composition that includes a surface coating material, a first enzyme, a first substrate and a second enzyme. Hamade and the '188 patent also do not teach or suggest a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Hamade and the '188 patent further do not teach or suggest a method for treating a surface of a vessel that includes applying a coating material to the surface wherein the coating material includes a first enzyme, a first substrate and a second enzyme.

These defects are not remedied by the Hansen and James references. Hansen describes the "purification and molecular cloning of hexose oxidase from *C. crispus*, and ... the cDNA sequence of the enzyme." See p. 11581 of Hansen. James describes glucoamylases, "methods used to assay glucoamylase activity," "structural analysis of glucoamylase and main amino acids involved in catalysis and starch binding" and "the use of glucoamylase in the industry." See Abstract of James. Further, Applicants submit that a person of skill in the art would not look to the James references as James relates to the food industry.

MPEP 2145, paragraph X. A, states that "[a]ny judgment on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill in that art at the time the claimed invention was made and **does not include knowledge gleaned only from applicant's disclosure**, such a reconstruction is proper" (emphasis added by Applicants) (citing *In re McLaughlin* 443 F.2d 1392, 1395 (CCPA 1971)). The Examiner's obviousness rejection of the claims violates the basic considerations of obviousness as set forth in MPEP 2141 ("[t]he

references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention.”).

Accordingly, claims 1, 49 and 50, and claims that depend from claim 1, are patentable over the combination of Hamade, the ‘188 patent, Hansen and James for at least the reasons described above. Applicants respectfully request reconsideration and withdrawal of this rejection.

Hamade in view of the ‘188 patent, Stougaard and James

The Examiner has rejected claim 1-3, 9-15, 34-35 and 40-50 under 35 U.S.C. § 103(a) as being unpatentable over Hamade in view of the ‘188 patent, U.S. Patent No. 6,251,626 to Stougaard (“Stougaard”) and James. See Office Action at p. 6-7. Claims 2-3, 9-15, 34-35, and 40-48 depend from independent claim 1. Claims 49 and 50 are independent claims.

As previously described, Hamade, the ‘188 patent and James do not teach or suggest an anti-fouling composition that includes a surface coating material, a first enzyme, a first substrate and a second enzyme. Hamade and the ‘188 patent also do not teach or suggest a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Hamade and the ‘188 patent further do not teach or suggest a method for treating a surface of a vessel that includes applying a coating material to the surface wherein the coating material includes a first enzyme, a first substrate and a second enzyme.

This defect is not remedied in Stougaard. Stougaard describes “[a] method of producing hexose oxidase by recombinant DNA technology, recombinant hexose oxidase and the use of such enzyme, in particular in the manufacturing of food products such as doughs and dairy products, animal feed, pharmaceuticals, cosmetics, dental care products and in the manufacturing of lactones.” See Abstract. Stougaard does not teach or suggest an anti-fouling composition that includes a second enzyme. Stougaard also does not teach or suggest a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Stougaard does not teach or suggest a method for treating a surface of a vessel that includes applying a coating material to the surface wherein the coating material includes a first enzyme, a first substrate and a second enzyme.

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Accordingly, claims 1, 49 and 50, and claims that depend from claim 1, are patentable over the combination of Hamade, the '188 patent, Stougaard and James for at least the reasons described above. Applicants respectfully request reconsideration and withdrawal of this rejection.

CONCLUSION

For the foregoing reasons, Applicants respectfully request reconsideration and withdrawal of the pending rejections. Applicants believe that the claims now pending are in condition for allowance.

A petition for a one-month extension of time is submitted herewith.

Should any further fees be required by the present Amendment, the Commissioner is hereby authorized to charge Deposit Account **19-4293**.

Respectfully submitted,

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